

55. $f(x) = \begin{cases} \sin x & -2\pi \leq x < 0 \\ \cos x & 0 \leq x \leq 2\pi \end{cases}$

b) $\lim_{x \rightarrow c} f(x)$ exist
 $(-2\pi, 0) \cup (0, 2\pi)$

c) only left limit $x = 2\pi$

d) only right $x = -2\pi$

Aug 26-9:33 AM

63. $y = 4.9t^2$ ave speed $\frac{y_2 - y_1}{x_2 - x_1}$
 $[0, 3]$

$$\frac{4.9 \cdot 3^2 - 4.9 \cdot 0^2}{3 - 0}$$

$\lim_{h \rightarrow 0} \frac{4.9(3+h)^2 - 4.9 \cdot 3^2}{h}$

Aug 26-9:40 AM

2.2 Limits Involving Infinity

Use the document to investigate the limit numerically. Then add a graph to illustrate the limit.

$\lim_{x \rightarrow -\infty} \frac{1}{x} = 0$

$\lim_{x \rightarrow \infty} \frac{1}{x} = 0$

HA at $y = 0$

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definition of horizontal asymptote

If $\lim_{x \rightarrow \infty} f(x) = L$ then HA at $y = L$
 or $\lim_{x \rightarrow -\infty} f(x) = L$

Find the horizontal asymptotes

$f(x) = \frac{\sin(x)}{x}$ $\lim_{x \rightarrow \infty} \frac{\sin(x)}{x} = 0$ HA at $y = 0$

$f(x) = \frac{x}{\sqrt{x^2 + 1}}$ HA $y = 1$
 $y = -1$

$\frac{x}{\sqrt{x^2}} = \frac{x}{|x|}$

$\sqrt{9} = 3$
 $\sqrt{x^2} = \sqrt{9}$
 $|x| = 3$
 $x = \pm 3$

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Estimate $\lim_{x \rightarrow 0} \frac{1}{x}$

$\lim_{x \rightarrow 0^+} \frac{1}{x} = \infty$
 $\lim_{x \rightarrow 0^-} \frac{1}{x} = -\infty$

VA at $x = 0$

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definition of vertical asymptote

If $\lim_{x \rightarrow c} f(x) = \infty$ then VA at $x = c$
 or $\lim_{x \rightarrow c} f(x) = -\infty$

Find the vertical asymptotes

$f(x) = \frac{1}{x^2}$ VA $x = 0$
 $\lim_{x \rightarrow 0^+} \frac{1}{x^2} = \infty$

$f(x) = \frac{2}{x-1}$ VA at $x = 1$
 $\lim_{x \rightarrow 1^+} \frac{2}{x-1} = \infty$
 $\lim_{x \rightarrow 1^-} \frac{2}{x-1} = -\infty$


HA $y = 0$ $\lim_{x \rightarrow \infty} \frac{2}{x-1} = 0$

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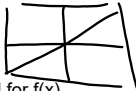
End behavior models $f(x) = \frac{x^2 - 1}{x + 2}$ $\frac{x^2}{x} = x$

Graph $y=f(x)$ in the following windows:

$[-15, 15] \times [-20, 10]$



$[-1500, 1500] \times [-2000, 1000]$




Suggest an end-behavior model for $f(x)$

$y = x$

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Find end behavior models

$y = \frac{2x^5 + x^4 - x^2 + 1}{3x^2 - 5x + 7}$ EBM $y = \frac{2x^5}{3x^2} = \frac{2}{3}x^3$



$y = \frac{x+1}{3x^2 - 4x + 5}$ EBM $y = \frac{x}{3x^2} = \frac{1}{3x}$ HA $y = 0$

$\frac{1}{x}$

Aug 30-9:24 PM